



BILL RICHARDSON
Governor

DIANE DENISH
Lieutenant Governor

ENTAIRED

TAOS

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1

Santa Fe, New Mexico 87505-6303

Phone (505) 476-6000 Fax (505) 476-6030

www.nmenv.state.nm.us



RON CURRY
Secretary

JON GOLDSTEIN
Deputy Secretary

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March 18, 2008

David Gregory
Federal Project Director
Los Alamos Site Office, Department of Energy
528 35th Street, Mail Stop A316
Los Alamos, NM 87544

David McInroy
Remediation Services Deputy Project Director
Los Alamos National Laboratory
P.O. Box 1663, Mail Stop A992
Los Alamos, NM 87545

**RE: INVESTIGATION OF CHROMIUM CONTAMINATION IN REGIONAL
GROUNDWATER, LOS ALAMOS NATIONAL LABORATORY
EPA ID #NM0890010515
HWB-LANL-GROUNDWATER-MISC**

Dear Messrs. Gregory and McInroy:

The New Mexico Environment Department (NMED) views the chromium contamination in regional groundwater beneath the Los Alamos National Laboratory (LANL) as a serious problem. NMED considers the ongoing investigation efforts by the United States Department of Energy (DOE) and Los Alamos National Security, LLC (collectively, the Permittees) as crucial to delineate chromium contamination in the vadose zone and understand chromium transport pathways to the regional groundwater, ultimately leading to selection of appropriate remedies. The vadose zone investigation is at a stage where conclusions can be drawn concerning the likelihood of chromium remaining in the vadose zone that continues to be a secondary contaminant source to the regional groundwater. The Permittees will submit the results of the fate and transport investigation to NMED for review by July 31, 2008 (as specified in NMED's December 17, 2007 letter), and these results should be useful to support the corrective measures evaluation and select appropriate remedies, if necessary, to address the potential secondary sources in the vadose zone.

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However, further delay of actions to directly address chromium contamination in the regional groundwater could result in irreparable damage to the regional aquifer. More than four years of groundwater monitoring data have been collected from well R-28; these data demonstrate that chromium concentrations in groundwater have consistently exceeded both the U.S. Environmental Protection Agency drinking water maximum contaminant level of 100 µg/L and the New Mexico human health standard for groundwater quality of 50 µg/L. The recent pumping test conducted in R-28 in November 2007 further confirms that chromium concentrations in regional groundwater stabilize over a range of 298 to 437 µg/L. Based on the Permittees' estimate (Hydrogeologic Synthesis Report, LA-14263-MS), average groundwater flow velocity for the regional aquifer in the vicinity of Mortandad Canyon, where R-28 is located, is approximately 95 feet per year. Chromium in the soluble species (hexavalent form) is likely to migrate as fast as the natural groundwater, if not faster. Assuming that the chromium plume passed by R-28 at a velocity similar to the average natural groundwater flow velocity, a lapse of more than four years indicates that the plume dimension along the groundwater flow direction is at least as long as 400 feet. Unfortunately, more precise estimates are impossible, as there are no data available to project the plume dimensions in the lateral and vertical directions.

NMED acknowledges that the recently-installed groundwater monitoring wells R-35a, R-35b and R-36 provide some early warning to ensure the safety of water supplied by municipal wells PM-3 and PM-1. However, waiting to take action until after chromium is detected in these sentry monitoring wells will be too late to apply corrective measures that would be of much benefit to restore the groundwater resource. The Permittees must therefore develop an exploratory investigation work plan (Plan) to delineate the nature and extent of chromium plume in the regional aquifer. Specifically:

1. In the Plan, the Permittees must propose to install at least two regional groundwater monitoring wells in the vicinity of R-28 to investigate the lateral and vertical extent of chromium contamination in the regional groundwater. One of the wells must be located to the east of R-28 and the south of R-11 in Mortandad Canyon. This well is intended to address potential migration of the chromium plume surrounding R-28 to the east along the projected regional groundwater flow direction. The other well must be drilled to the south of R-28 (close to 0.25 mile) on the mesa top adjacent to Mortandad Canyon (on the south side of the unpaved service road from PM-5 to R-28) to define the lateral dimension of the chromium plume. Each boring must be advanced into the older fanglomerates or the older river gravels, and core samples or cuttings must be collected from the pumiceous sediments, the older river gravels, and the older fanglomerates for chemical analysis to assess chromium interactions with these solid materials. This information will be useful to support remedy selection when conducting the corrective measures evaluation. Each borehole must be converted to a monitoring well with two screened intervals—one in the pumiceous sediments at a depth similar to the screened interval of R-28, and the other either in the older river gravels or the older fanglomerates at a depth approximately 100 feet deeper than the upper screen. The exact screened intervals must be chosen

based on field observations of the hydrology and stratigraphy. A sampling system that is capable of effectively purging groundwater from the screened intervals prior to collecting water samples must be installed in each well. The two screened intervals must be securely separated by packers, and the well must be constructed in such a way to ensure isolation of each groundwater bearing zone. During drilling, if perched groundwater is encountered, all necessary measures must be taken to isolate the saturated zones, and geochemical analyses must be conducted on all saturated zones to evaluate potential contamination. Alternatively, the Permittees may install two single-completion wells in lieu of a single well with two screened intervals.

2. In the December 17, 2007 letter, NMED approved the Permittees' drilling work plan for installation of R-42—a regional groundwater monitoring well to be placed in west of R-28 in Mortandad Canyon—and SCI-2, an intermediate groundwater monitoring well to be sited in Sandia Canyon. The Permittees must refine the proposed location at R-42 to the east of MCOBT-8.5 to allow it to function for identification of chromium transport pathways and delineation of the chromium plume west of R-28.

If no perched groundwater or significant chromium in the deep vadose zone is detected at boring SCI-2, this borehole must be extended deeper to the regional aquifer, and be converted to a regional aquifer groundwater monitoring well. Based on the Permittees' current conceptual model, SCI-2 is proposed in a location where high infiltration occurred, and thus may represent a primary entry point for chromium to reach the regional groundwater table. Such a monitoring well will be helpful to determine current chromium concentrations in the regional groundwater directly beneath the high infiltration area. To facilitate real-time decision making when drilling SCI-2, the Permittees must provide geochemical data to confirm chromium inventory in the deep vadose zone by performing quick turn-around sample analysis of core samples or cuttings collected during drilling of SCI-2.

The Permittees must submit a work plan to investigate the nature and extent of chromium contamination in the regional groundwater to NMED for approval no later than April 30, 2008. The two new wells that have been specified in the above Requirement 1 must be completed no later than October 1 and 31, 2008, respectively. The wells of SCI-2 and R-42 mentioned in the above Requirement 2 must be completed no later than April 30 and June 30, 2008, respectively, as already indicated in NMED's December 17, 2007 letter. If borehole of SCI-2 needs to be converted to a regional groundwater monitoring well as specified in Requirement 2, this regional well must be completed no later than May 31, 2008.

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Should you have any questions or comments, please contact Hai Shen of my staff at (505) 476-6039.

Sincerely,



James P. Bearzi
Chief
Hazardous Waste Bureau

JPB:hs

cc: D. Cobrain, NMED HWB
J. Young, NMED HWB
K. Roberts, NMED HWB
H. Shen, NMED HWB
T. Skibitski, NMED DOE OB
S. Yanicak, NMED DOE OB, MS J993
B. Olson, NMED GWQB
L. King, EPA 6PD-N
G. Rael, DOE LASO, MS A316
M. Johansen, DOE LASO, MS A316
S. Stiger, LANL ENV, MS J591
P. Huber, LANL ENV, MS M992
D. Katzman, LANL ENV, MS M992

file: Reading and LANL General (Mortandad Canyon, Groundwater General, Cr Contamination)